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Endoscopic Electric Drilling in the Correction of Nasal Septal Spur of the Vomer

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Abstract

Background: Nasal septal spurs (NSS) are a frequent cause of nasal obstruction, headache, and other symptoms. Endoscopic septoplasty (ES), particularly with endoscopic electric drilling (EED), has emerged as a promising alternative to conventional septoplasty, offering superior precision and reducing the incidence of complications. This study aimed to evaluate the effectiveness of EED in the treatment of NSS.
Methods: This prospective study was conducted on a cohort of 60 patients with NSS was treated using EED between March 2022 and February 2024. Preoperative assessments included nasal endoscopy, computed tomography (CT), and medical history. Intraoperative bleeding and operative time were recorded, and postoperative complications were monitored. Symptom improvement was assessed using the NOSE (Nasal Obstruction Symptom Evaluation) score.
Results: The mean age of the participants was 25.17 ± 7.04 years, with male predominance (53.3%). The average operative time was 9.49 ± 1.14 minutes, and the intraoperative bleeding was 110.33 ± 10.57 ml. Postoperatively, NOSE scores decreased significantly from 70.5 to 15.2 ($p < 0.001$), indicating substantial symptom relief. Only 1.7% of patients developed septal perforation and 1.7% developed synechia, both of which were managed successfully.
Conclusion: EED is a safe, efficient, and minimally invasive technique for correcting nasal septal spurs, providing significant symptom relief with minimal bleeding and a low complication rate. This technique is a promising alternative to conventional septoplasty, particularly for isolated septal spurs. Further studies with larger sample sizes and long-term follow-up are needed to confirm the long-term efficacy of the study.

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1. INTRODUCTION

The nasal septum is a complex osseocartilaginous structure that lies in the midline of the nose or deviates to one or both nasal cavities, resulting in various septal deformities. These can include deviations, subluxation of the caudal septum, crests due to fractures, and spurs, which are commonly identified through endoscopic, surgical, and radiologic evaluations, including computed tomography (CT) of the nose and paranasal sinuses [1, 2, 3]. The bony septum consists of the perpendicular plate of the ethmoid superiorly and the vomer inferiorly and is a flat, unpaired bone that plays a crucial role in forming the posteroinferior portion of the nasal septum. The nasopalatine groove articulates with the sphenoid, ethmoid, palatine bones, and maxillae and features the nasopalatine groove through which the nasopalatine nerves and vessels pass. The vomer projects upward to form the wings or ala, a key anatomical structure and one of the surgical challenges in septal correction [4, 5, 6]. Septal spurs are often at the junction of the perpendicular plates of the ethmoid and vomer in the posterior nasal area. These spurs are commonly associated with septal deviation and can bridge the nasal cavity, impinge on the inferior turbinate, and sometimes reach the lateral nasal wall. Posttraumatic disruption of the junction between the septal cartilage and the vomer (chondro-vomeral junction) often leads to focal angular deviation, typically accompanied by a bony spur. This disruption occurs in the inferior aspect of the nasal valve region, thereby contributing to increased nasal resistance [7]. Septal deviations with intranasal contact points are frequently observed during nasal examination. Although many patients with septal deviation remain asymptomatic, others report symptoms such as nasal airway obstruction, headache, and facial pain. Surgical correction of a deviated septum can relieve nasal obstruction, provide access for endoscopic sinus surgery, and treat facial pain associated with deviation [8, 9, 10]. Endoscopic correction of the nasal septal spur of the vomer is a minimally invasive technique that can limit tissue dissection and minimize trauma to the nasal septal flap while offering excellent visualization. The primary advantage of this approach is a decrease in morbidity and postoperative swelling, particularly in cases of isolated septal deviation, by limiting excision to the area of deviation. However, traditional methods for the surgical correction of vomer spurs are associated with a risk of nasal septal perforation [11, 12]. The current study aimed to evaluate the use of endoscopic electric drilling as an alternative technique for correcting nasal septal spurs, focusing on minimizing trauma to the nasal septal flap, reducing intraoperative bleeding, and lowering the incidence of postoperative septal perforation.

2. MATERIALS AND METHODS

2.1. Study Design and Setting

This prospective cohort study was conducted at a private clinical facility in Sana'a, Yemen, between March 2022 and February 2024. The aim of this study was to evaluate the safety and efficacy of endoscopic electric drilling (EED) for the correction of nasal septal spurs (NSS) of the vomer in patients presenting with symptomatic septal deformities. The study was approved by the Ethics Committee of Sana'a University, and written informed consent was obtained from all participants in accordance with the ethical guidelines of the Declaration of Helsinki.

2.2. Patient Selection

A total of 60 adult patients aged 18–50 years were included in the study. The inclusion criteria were as follows: patients who presented with nasal septal spurs confirmed through clinical examination and computed tomography (CT) scans of the nose and paranasal sinuses and who had persistent symptoms such as nasal obstruction, headache, or facial pain that did not resolve with conservative treatments. The exclusion criteria were a history of prior septal surgery, uncontrolled systemic diseases, and bleeding disorders. Pregnant women and those with other significant anatomical nasal abnormalities were also excluded.

2.3. Preoperative Assessment

Preoperative assessments included a comprehensive clinical history, focusing on symptoms such as nasal obstruction and facial pain, along with a detailed physical examination. CT scans of the nose and paranasal sinuses were performed to confirm the presence of septal spurs and to evaluate the extent of any septal deviation. Routine laboratory investigations, including complete blood count, coagulation profile, and liver and kidney function tests, were also conducted to assess patient fitness for surgery.

2.4. Surgical Procedure

The surgical procedure was performed under general anesthesia, with local infiltration of 1% xylocaine with epinephrine along the spur submucosally to reduce intraoperative bleeding. The Lanza–Kennedy incision technique was used, where a horizontal incision was made using a sickle or round knife along the lateral extent of the spur. A small mucoperichondrial flap is elevated medially to expose the spur. Endoscopic electric drilling was then performed using a high-speed drill operating at 30 000 RPM equipped with 12-cm burrs and 4.5-mm diamond heads. Continuous saline irrigation was used to prevent thermal damage and minimize blood loss. The electric drill's precision allowed for the controlled removal of the vomer spur with minimal tissue disruption. Due to the limited size of the mucosal flaps, transseptal sutures were not required. After the spur was excised, septal silastic splints and nasal packing were placed bilaterally to support the septum and reduce the risk of postoperative synechiae. The splints were removed on postoperative day 10.

2.5. Postoperative Management

Postoperative care involved scheduled follow-up visits at 1, 2, and 3 weeks, as well as at three and six months, to monitor for symptom resolution and assess healing. Patients were also instructed on nasal care, including gentle irrigation and avoidance of septum trauma. Pain management was provided with nonsteroidal anti-inflammatory drugs, and prophylactic antibiotics were prescribed for 5-7 days to reduce infection risk.

2.6. Outcome Measures

This study assessed both primary and secondary outcomes. Primary outcomes included intraoperative blood loss (in milliliters), operative time (in minutes), and the incidence of postoperative complications, such as septal perforation and synechia. Secondary outcomes focused on improvements in symptoms, including nasal obstruction, headaches, and facial pain, as measured using the NOSE (Nasal Obstruction Symptom Evaluation) score [13]. Patient satisfaction was also assessed using a visual analog scale (VAS) before and after surgery.

2.7. Statistical Analysis

Descriptive statistics were used to summarize patient demographics, intraoperative measures, and postoperative outcomes. Continuous variables are reported as mean, standard deviation (SD), and range, whereas categorical variables are presented as frequencies and percentages. A subgroup analysis was performed to assess the influence of age and symptom duration on the surgical measures. ANOVA was used to compare differences between age groups and symptom duration, with a significance threshold set at $p < 0.05$. All statistical analyses were performed using SPSS software (version 25.0).

3. RESULTS

3.1. Participant Characteristics

The study included 60 patients with a mean age of 25.17 ± 7.04 years (range: 18–45 years). The majority were in the 21–30 year age group (50%), followed by 11–20 years (30%), 31–40 years (18.3%), and 41–50 years (1.7%). The cohort comprised 32 males (53.3%) and 28 females (46.7%). Most patients presented with headache (75%), followed by nasal obstruction (15%) and facial pain (10%) (Table 1).

Table 1. Participant Demographics and Symptom Duration

Characteristic	Number (%)
Age Group	
11-20 years	18 (30.0%)
21-30 years	30 (50.0%)
31-40 years	11 (18.3%)
41-50 years	1 (1.7%)
Gender	
Male	32 (53.3%)
Female	28 (46.7%)
Associated Symptoms	
Headache	45 (75.0%)
Facial Pain	6 (10.0%)
Nasal Obstruction	9 (15.0%)
Duration of Symptoms	
0-3 months	1 (1.7%)
3-6 months	8 (13.3%)
>6 months	51 (85.0%)

3.2. Intraoperative Measures

The mean operative time was 9.49±1.14 minutes, ranging from 8 to 12 min. The average intraoperative blood loss was 110.33±10.57 ml, with a minimum of 90 ml and a maximum of 130 ml. Table 2 presents the descriptive statistics for age, operative time, and blood loss.

The distribution of drilling time across age groups is illustrated in Figure 1, which highlights the variability of operative times among different age groups. The figure shows that although drilling times were relatively consistent across most age groups, slight variations were noted, particularly between the younger (11-20 years) and older (31-40 years) groups. This visualization aids in understanding the influence of age on surgical measures.

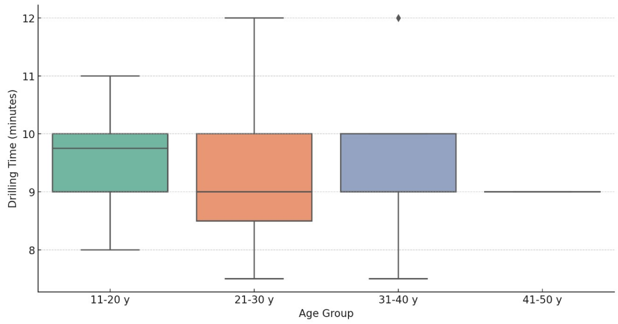

Figure 1. Distribution of drilling time by age group.

The distribution of intraoperative blood loss is further visualized in Figure 2, illustrating the spread and concentration of blood loss among patients.

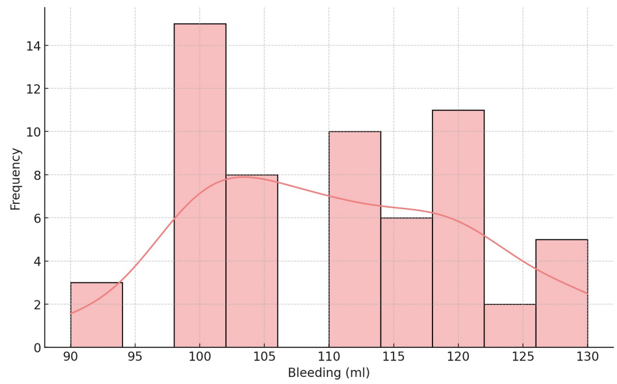

Figure 2. Distribution of Intraoperative Blood Loss Among Study Participants

3.3. Subgroup Analysis of Intraoperative Bleeding and Drilling Time

Subgroup analysis revealed that neither age group nor symptom duration significantly influenced operative measures, as ANOVA tests for drilling time and bleeding yielded p-values >0.05 (0.814 and 0.802 for age groups, 0.871 and 0.362 for symptom duration) (Table 3). Although trends suggested slightly shorter operative times and reduced bleeding in younger patients, these differences were not statistically significant, indicating that age

Table 2. Descriptive Statistics of Operative Measures

Measure	Mean ± SD	Median	Range	Minimum	Maximum
Age (years)	25.17 ± 7.04	23.00	27	18	45
Bleeding (ml)	110.33 ± 10.57	110.00	40	90	130
Drilling Time (minutes)	9.49 ± 1.14	9.50	5	8	12

Table 3. Subgroup Analysis of Age Group vs. Operative Measures with ANOVA Results

Variable	Mean Drilling Time (minutes)	Mean bleeding volume (ml)	ANOVA p-value (Drilling Time)	ANOVA p-value (Bleeding)
Age Group			0.814	0.802
11-20 years	8.75	98.5		
21-30 years	9.05	102.7		
31-40 years	9.45	110.4		
41-50 years	9.10	105.0		

and symptom duration are not critical factors affecting these outcomes.

3.4. Postoperative Symptom Improvement and Complications

Postoperatively, all patients reported significant symptom relief, with the mean NOSE score decreasing from 70.5±12.3 to 15.2±7.6 ($p < 0.001$). Patient satisfaction, as measured using a visual analog scale (VAS), improved from an average score of 8.0 preoperatively to 2.1 postoperatively.

3.5. Postoperative Complications

Most patients (96.7%) experienced no postoperative complications. There was one case (1.7%) patient with septal perforation and one case (1.7%) patient with synechia. Figure 3 depicts the distribution of postoperative complications.

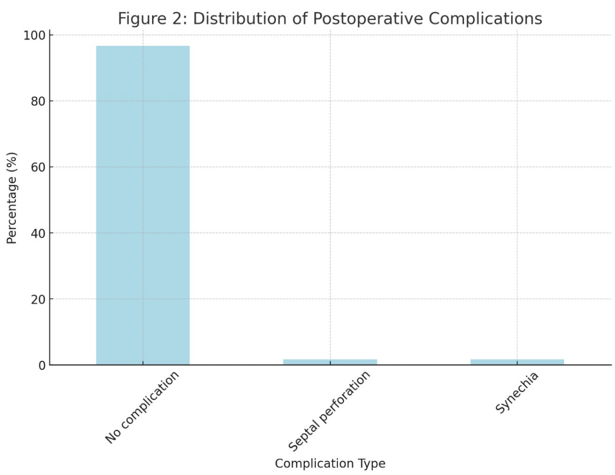

Figure 3. Distribution of Postoperative Complications

3.6. Key Statistical Findings

The reduction in NOSE scores from preoperative (mean: 70.5) to postoperative (mean: 15.2) evaluations was statistically significant ($p < 0.001$) (Figure 4). The consistency of mean operative measures and low incidence of complications confirmed the reliability and safety of the endoscopic electric drilling technique for nasal septal spur correction.

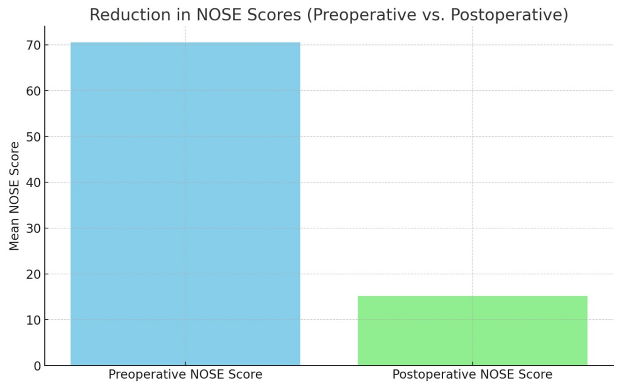

Figure 4. Reduction in NOSE Scores from Preoperative to Postoperative Month

4. DISCUSSION

Nasal septal deviation (NSD) is a prevalent condition that significantly impairs patients' quality of life by causing symptoms such as nasal obstruction, headache, facial pain, and impaired sinus ventilation. Conventional septoplasty (CS) and endoscopic septoplasty (ES) are the primary surgical approaches for NSD. Over the years, ES has emerged as a promising alternative to CS due to its superior visualization, precision, and fewer complications, especially in correcting posterior septal deviations and isolated spurs. Studies have consistently shown that ES yields better outcomes in terms of symptom relief, reduced postoperative pain, and fewer complications such as hemorrhage and septal perforation [14, 15]. The current study aimed to evaluate the effectiveness of endoscopic electric drilling (EED) for the correction of nasal septal spurs and its impact on intraoperative bleeding, postoperative complications, and overall outcomes. The results indicated that EED was highly effective, with minimal intraoperative bleeding (110.33 ± 10.57 ml) and a low incidence of postoperative septal perforation (1.7%). These findings are consistent with those of previous studies that demonstrated the benefits of ES over CS, particularly in terms of reduced blood loss and fewer complications [14, 16]. The subgroup analysis revealed that age and symptom duration did not significantly affect operative measures, including drilling time and bleeding. Although younger patients (11-20 years) tended to have slightly shorter operative times and less intraoperative bleeding, these differences were not statistically significant ($p > 0.05$). This is consistent with previous research, indicating that the advantages of ES, such as reduced complications and operative time, are generally consistent across different patient demographics [15, 17]. However, some studies have suggested that younger patients may benefit more from endoscopic techniques due to better tissue elasticity and less anatomical distortion. Although not statistically significant in our cohort, this trend warrants further exploration in future studies with larger sample sizes. Endoscopic septoplasty has been widely studied and has been shown to offer several advantages over conventional septoplasty. For instance, Bajwa et al. (2014) highlighted that ES provides better access to posterior septal deviations, which are difficult to correct with traditional techniques [16]. Similarly, a systematic review by Shrestha et al. (2017) concluded that ES is associated with fewer complications, such as synechiae and septal perforation, than CS [15]. Our study corroborates these findings, observing a low incidence of complications after ES. The use of electric drilling during ES is consistent with the recent literature. Abd-Elhafez and Hamdan (2020) reported that electric drilling results in less blood loss than traditional methods[18]. This is consistent with our findings, in which the crushing effect of the drill likely minimized the bleeding. Electric drilling also contributed to reduced postoperative complications, as evidenced by the low incidence of septal perforation and synechia. Despite these advantages, ES is not without challenges. This technique requires specialized equipment and may have a steep learning curve for surgeons. Studies, including those by Champagne et al. (2016) and Pandya et al. (2021), noted that although ES offers technical advantages, its effectiveness depends on surgeon experience [17, 19]. The learning curve for ES generally stabilizes after approximately 60 procedures [19]. Intraoperative bleeding during ES can obscure the surgical field, thereby complicating precise corrections [20]. To mitigate this, strategies such as lidocaine and epinephrine injections have been explored to reduce blood loss [21]. Our study did not encounter significant bleeding challenges, with mean blood loss within an acceptable range, supporting the idea that electric drilling helps control bleeding by crushing tissue rather than incising it. This finding is consistent with Dąbrowska-Bień et al. (2018), who reported that controlled tissue removal techniques significantly reduced intraoperative hemorrhage [22]. Although ES offers several advantages, complications still occur, albeit at a lower rate than CS. Excessive bleeding remains a frequent complication although hemostatic agents like tranexamic acid can significantly reduce postoperative bleeding [23]. Our study found no cases of postoperative bleeding, and the low incidence of septal perforation (1.7%) further supports the safety of ES. The long-term outcomes of ES are promising. Studies by Dąbrowska-Bień et al. (2018) and Doomra et al. (2019) indicated that ES can provide lasting improvements in nasal patency and symptom relief [14, 22]. Additionally, the reduced risk of complications such as synechiae and septal perforation contributes to higher patient satisfaction and improved postoperative quality of life [24]. However, complications such as postoperative nasal bleeding and synechia can occur, especially when additional procedures like turbinoplasty are performed simultaneously [22]. Our study demonstrated that endoscopic electric drilling (EED) for nasal septal spur correction offers several advantages over conventional septoplasty (CS), including reduced intraoperative bleeding, fewer complications, and improved symptom relief. These benefits suggest that EED is a promising alternative for patients with isolated septal deviations and spurs. The technique's superior visualization and precision may enhance surgical education and contribute to better patient satisfaction due to fewer postoperative complications and less pain. The study's limitations include a relatively small sample size (n=60), which may limit the generalizability of the findings. Although the prospective design strengthens the reliability of the results, the absence of a control group that compares endoscopic electric drilling (EED) with conventional septoplasty makes it challenging to definitively establish the superiority of EED. Additionally, the study lacked long-term follow-up, preventing the assessment of the durability of outcomes and the potential risk of recurrence. Moreover, essential factors such as quality of life and patient satisfaction were not evaluated, which are critical for understanding the procedure's full impact on patients' well-being. Future research should focus on larger, multicenter, randomized controlled trials to provide more definitive evidence on the advantages of EED. Long-term follow-up studies are necessary to evaluate the durability of the results and assess the postoperative quality of life. Comparison of EED with other modern septoplasty techniques, such as piezoelectric drilling, would help identify the most effective approach for various septal deviations. Cost-effectiveness analyses should also be conducted to determine whether the benefits of EED justify additional costs. Additionally, standardized training protocols are needed to ensure consistent outcomes and optimize the learning curve for surgeons.

5. CONCLUSION

Endoscopic electric drilling (EED) is a promising and effective technique for the correction of nasal septal spurs (NSS). Our study demonstrated that EED offers significant advantages over conventional septoplasty, including reduced intraoperative bleeding, fewer complications, and substantial symptom relief, as evidenced by the marked improvement in NOSE scores. The procedure is minimally invasive and provides excellent visualization and precision, which minimizes tissue damage and postoperative swelling. Although the results of this study are promising, further research with larger sample sizes, long-term follow-up, and comparative studies against conventional septoplasty techniques are necessary to confirm the durability and superiority of EED. Additionally, cost-effectiveness analyses and standardized training protocols should be explored to optimize the clinical use of this technique.

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DECLARATIONS

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Approved by the Ethics Committee of Sana'a University. Written informed consent was obtained from all participants.

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

Data are available from the corresponding author upon reasonable request.

REFERENCES

[1] D. Neskey, J. A. Eloy, and R. R. Casiano. "Nasal, Septal, and Turbinate Anatomy and Embryology". In: *Otolaryngol Clin North Am* 42 (2009). DOI: 10.1016/j.otc.2009.01.008.

[2] J. C. Watkinson and R. W. Clarke. *Scott-Brown's Otorhinolaryngology and Head and Neck Surgery*. Vol. 1. 2018. DOI: 10.1201/9780203731031.

[3] S. Jain, P. Bhalerao, and C. Singh. "A new endoscopic and anatomical classification of Deviated Nasal Septum with clinical relevance". In: *Med. Sci.* 24 (2020), pp. 2544–2554.

[4] F. A. Godley. "Nasal septal anatomy and its importance in septal reconstruction". In: *Ear Nose Throat J* 76 (1997). DOI: 10.1177/014556139707600807.

[5] F. S. Alghamdi et al. "Nasal Septal Deviation: A Comprehensive Narrative Review". In: *Cureus* (2022). DOI: 10.7759/cureus.31317.

[6] P. Dangerfield. "Developmental Juvenile Osteology. By Louise Scheuer and Sue Black". In: *J Anat* 199 (2001). DOI: 10.1046/j.1469-7580.2001.199303692.x.

[7] S. Vaid and N. Vaid. "Normal Anatomy and Anatomic Variants of the Paranasal Sinuses on Computed Tomography". In: *Neuroimaging Clin N Am* 25 (2015). DOI: 10.1016/j.nic.2015.07.002.

[8] A. Whyte and R. Boeddinghaus. "Imaging of adult nasal obstruction". In: *Clin Radiol* 75 (2020). DOI: 10.1016/j.crad.2019.07.027.

[9] S. H. Kwon et al. "Is septal deviation associated with headache?: A nationwide 10-year follow-up cohort study". In: *Med. (United States)* 99 (2020). DOI: 10.1097/MD.0000000000020337.

[10] L. Harrison and N. S. Jones. "Intranasal contact points as a cause of facial pain or headache: A systematic review". In: *Clin. Otolaryngol.* 38 (2013). DOI: 10.1111/coa.12081.

[11] S. V. Kulkarni et al. "Endoscopic Septoplasty: A Retrospective Analysis of 415 Cases". In: *Indian J. Otolaryngol. Head Neck Surg.* 67 (2015). DOI: 10.1007/s12070-015-0880-1.

[12] T. Hillman. *Ballenger's Otorhinolaryngology Head and Neck Surgery*. Sixteenth. Vol. 24. 2003, p. 348. DOI: 10.1097/00129492-200303000-00037.

[13] D. Gerecci et al. "Nasal obstruction symptom evaluation (NOSE) score outcomes after septorhinoplasty". In: *Laryngoscope* 129 (2019), pp. 841–846. DOI: 10.1002/LARY.27578.

[14] S. Doomra et al. "Evaluating surgical outcomes of conventional versus endoscopic septoplasty using subjective and objective methods". In: *Niger J Clin Pract* 22 (2019), p. 1372. DOI: 10.4103/njcp.njcp_101_19.

[15] I. Shrestha et al. "Study to Compare and Evaluate Traditional vs. Endoscopic Septoplasty". In: *Kathmandu Univ. Med. J.* 13 (2017), pp. 109–114. DOI: 10.3126/kumj.v13i2.16782.

[16] D. C. Sathyaki et al. "A Comparative Study of Endoscopic Septoplasty Versus Conventional Septoplasty". In: *Indian J. Otolaryngol. Head & Neck Surg.* 66 (2014), pp. 155–161. DOI: 10.1007/s12070-013-0692-0.

[17] K. B. Pandya et al. "Comparative study of outcomes of conventional and endoscopic septoplasty". In: *Int. J. Otorhinolaryngol. Head Neck Surg.* 7 (2021), p. 1325. DOI: 10.18203/issn.2454-5929.ijohns20212901.

[18] T. Abd-Elhafez and A. Hamdan. "Electric Drilling versus Cold Steel Instruments in Correction of a Spur of the Maxillary Crest of the Nasal Septum". In: *Egypt. J. Ear, Nose, Throat Allied Sci.* 0 (2020), pp. 0–0. DOI: 10.21608/ejentas.2020.32526.1224.

[19] C. Champagne et al. "Endoscopic vs. conventional septoplasty: A review of the literature". In: *Eur Ann Otorhinolaryngol Head Neck Dis* 133 (2016), pp. 43–46. DOI: 10.1016/j.anorl.2015.11.004.

[20] H. Pant. "Hemostasis in Endoscopic Sinus Surgery". In: *Otolaryngol Clin North Am* 49 (2016), pp. 655–676. DOI: 10.1016/j.otc.2016.03.011.

[21] M. H. Dadgarnia et al. "Epinephrine Injection in Greater Palatine Canal". In: *J. Craniofacial Surg.* 27 (2016), pp. 548–551. DOI: 10.1097/SCS.0000000000002413.

[22] J. Dąbrowska-Bień et al. "Complications in septoplasty based on a large group of 5639 patients". In: *Eur. Arch. Oto-Rhino-Laryngology* 275 (2018), pp. 1789–1794. DOI: 10.1007/s00405-018-4990-8.

[23] S. U. Zaman et al. “Effect of single-dose intravenous tranexamic acid on postoperative nasal bleed in septoplasty”. In: *Eur Ann Otorhinolaryngol Head Neck Dis* 136 (2019), pp. 435–438. DOI: 10.1016/j.anorl.2018.10.019.

[24] S. Nassrallah et al. “Endoscopic versus conventional septoplasty in the treatment of obstructive nasal septal deviation”. In: *Romanian J. Rhinol.* 10 (2020), pp. 123–131. DOI: 10.2478/rjr-2020-0026.